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ABSTRACT

Changes in the way contemporary organizations conduct business demand a concurrent redesign of teaching and testing methods. Maintaining instructional quality must begin with knowledge of the quality revolution in contemporary organizations in order to meet the demands of these organizations for self-confident, self-directed, self-motivated, team-oriented, quality-sensitive, and customer-directed employees. Teachers must assure the complementary development of student interest, appreciation, pride of workmanship, and skills in learning, constant improvement, leadership, and collaboration. In a quality classroom, the teacher and students share responsibility for learning course content and for developing thinking, judgment, and interpersonal communication. Quality teachers envision and manage their classrooms as exemplary organizations, and minimize student fear and competitiveness. At Santa Fe Community College, in New Mexico, instructors have been teaching and testing students with an emphasis on principles of collaboration and continuous quality improvement (CQI). The CQI approach to objective testing begins with a class discussion of the demand for collaborative work in contemporary organizations, explains the linkages between collaborative learning and future employment opportunities, and evaluates students both on their individual and collaborative knowledge. After tests are taken by both individuals and teams, the instructor notes the most frequently misunderstood questions to identify the "significant few" learning points that need continued instruction. Data collected in a recent Business and Management course indicate that this quality testing approach delivers measurable improvement in student learning as defined by continuous improvement on unit tests. Student responses further substantiate the merit of quality teaching and learning processes. (AC)

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RETHINKING TEACHING AND TESTING:

QUALITY IN THE CLASSROOM

Brian P. Cooke

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RETHINKING TEACHING AND TESTING:

QUALITY IN THE CLASSROOM

Brian P. Cooke

This article describes how change in the ways contemporary organizations conduct business demands concurrent redesign of teaching and testing methods. It explores the link between quality learning and students' subsequent employment opportunities. It proposes teachers manage their classrooms as exemplary quality organizations. It describes aspects of quality management most relevant for classroom teachers. It introduces a testing approach consistent with organizational emphasis on continuous improvement and collaboration.

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Rethinking Teaching and Learning: Quality in the Classroom

While school administrators have begun to recognize how quality management can assure and improve operational effectiveness, teachers typically are less informed about uses of quality management in their classrooms. Although administrative applications of quality are significant, quality teaching and learning are essential for our students' and our society's continued economic competitiveness and quality of life.

Successful instructional quality must begin with knowledge of the quality revolution in contemporary organizations. While American industry and government reengineers and reinvents itself, American teachers and students must recognize the scope and impact of such change and rethink teaching and learning processes accordingly. Yesterday's schools that seated students in neatly arranged rows, taught them by rote, and ranked them by performance on tests prepared individuals for highly bureaucratized, tightly controlled industries. Today's schools must meet the demand of quality organizations for self-confident, self-directed, self-motivated, team-oriented, quality-sensitive, customer-directed employees.

Among their many responsibilities, schools have always been expected to prepare students for employment. Since contemporary work is becoming more learning and quality oriented, teachers must assure complementary development of student interest, appreciation, and skill in learning and quality. Teachers committed to preparing students for professional

and vocational opportunities must share employers' emphasis on constant improvement, leadership, collaboration, and pride of workmanship.

In a quality classroom, the teacher and students share responsibility both for learning course content and for developing thinking, judgement and interpersonal communication. While respecting the integrity of the curriculum, students concurrently appreciate the importance of analysis and explication. This dual emphasis on course content and learning process is essential in a global economy where the breadth of professional and technical information defies individual mastery and demands collaboration.

Quality teachers envision and manage their classrooms as exemplary quality organizations. Like quality managers, quality teachers surrender absolute control and authority. They coach and counsel, not preach and profess. They steer students toward relevant knowledge, not inspect their work for defective understanding. They delegate more and lecture less. They cease destructive competition and nurture confidence in empowering collaboration.

Quality teachers minimize student fear and competitiveness. They do not evaluate student success solely through examinations. They introduce frequent, creative exercises that enhance continuous learning and personal development. They reward learning and deemphasize test scores. They strive for total quality work from all students. They abandon standard grade distributions. They accentuate applied knowledge and long-term understanding. They deemphasize short-term test performance. They consider quality education a challenging journey, not a specific destination. They expect continuous revision and improvement of student work.

At Santa Fe Community College (NM), instructors have begun teaching and testing students with emphasis on principles of collaboration and continuous quality improvement. In my classroom, I model teaching as a quality service by identifying and meeting student requirements and expectations. At the beginning of each course my students and I complete the Moment-of-Truth Chart recommended by quality service guru Karl Albrecht. Table 1 illustrates a Moment-of-Truth chart prepared in a recent Business & Management course. This chart establishes key indicators for quality teaching that help assure quality learning throughout the semester. The process of completing the chart initiates a collaborative relationship between teacher and students that develops student commitment and ownership of the learning process.

In addition to modeling quality service and maintaining a quality classroom environment, Santa Fe Community College instructors are adopting a continuous quality improvement process for objective testing. This approach modifies the traditional practice of teaching to the test, reviewing for the test, giving the test, grading the test, returning the graded test and beginning instruction for the next test. Unlike traditional objective testing, this quality testing process develops student commitment, confidence and skill in group problem-solving an decision-making. It requires individual and group responsibility for learning. It emphasizes collaborative methods and skills. It facilitates measurable improvement in mastery of information.

Table 2 is a deployment flow chart of this quality testing process. The process begins with discussion of the demand for collaborative work in contemporary quality organizations. It explains the linkages between collaborative learning and future opportunities for

employment. At the beginning of each course, students are told they will be evaluated both on their individual and collaborative knowledge. They then are instructed to form teams. These teams typically are no smaller than three people and no larger than seven. Team membership remains fixed for a predetermined period, ie. for the semester, quarter or until mid-term. The team formation process itself is an important learning exercise. Once teams have formed, the instructor may lead discussion about how students chose teammates and how team size may affect dynamics and results of team decision-making.

On the day of the multiple choice or true/false test, the instructor distributes the exercise to individual students who complete and return their examination. The instructor then scores each individual test by indicating how many answers are incorrect. The instructor, however, does not indicate which answers are incorrect. The instructor returns the tests to students and invites them to revise their initial answers. This step gives students an opportunity to identify their errors and improve their own work.

After all individual tests are self-corrected and returned to the instructor, students are directed to join their teammates. The same exercise is now distributed to each team with instructions to prepare its team answers. While the teams deliberate, the instructor observes and facilitates collaboration.

The teams complete and return their answers to the instructor for correction. For purposes of prioritizing future teaching, the instructor notes the questions that are most frequently misunderstood. Applying the Pareto principle, these questions represent the "significant few" learning points that require continued instruction. The instructor concludes

the process by scoring the team answers, posting all scores and leading a discussion about questions and learning points that require additional explanation.

Data collected in a recent Business & Management course indicate this quality testing approach delivers measurable improvement in student learning as defined by continuous improvement on unit tests. Table 3 is an attributes control chart that describes the number of correct answers for each student on three unit tests. Each test was comprised of twenty multiple-choice and true-false questions. The mean number of correct answers is 14.5. The system is not stable. Student F's performance on Test 2 is slightly beneath the lower control limit. This special cause is explained by an illness that interfered with the student's test preparation. Student F's performance on Tests 1 and 3 suggest no need for alarm or overcontrol in response to the Test 2 score.

Table 4 is an attributes control chart that describes the number of correct answers for each student on the three self-corrected unit tests. The mean number of correct answers is 15.0. This is an average improvement of 0.5 on the initial individual test. The system is stable.

Table 5 is an attributes chart that describes the number of correct answers for each student on the team unit test. The mean number of correct answers is 17.3. This represents an average improvement of 1.8 on the initial test score. The system is stable. A comparison of student scores on all tests indicates this testing approach is a systematic process for continuous improvement of learning.

A survey of students conducted at the conclusion of courses using this testing approach further substantiates the merit of quality teaching and learning processes. Most

students agree that collaborative testing is an effective way to encourage, assess and improve learning. In addition to developing deeper knowledge of the subject, students learn how to listen, evaluate, question, persuade, resolve disagreement and learn from others. Although only 39 percent of students were initially comfortable with group tests, 61 percent are more confident working groups at the end of the course. 75 percent believe group testing is an effective way to learn. The survey results are summarized in Table 6.

The quality approach to teaching and testing described in this article shifts students' focus from evaluation to continuous learning. It requires students to take responsibility for their own education. It eliminates student dependence on the instructor for direction and validation. Students trained in quality classrooms believe they conclude their studies with greater self-confidence and interpersonal skills that improve their likelihood of professional and personal success. One of my students recommends this quality approach "because it is an effective model of real life situations we will encounter as members of the work force."

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Table 1. Moment of Truth Chart — Meet or Exceed Customer Requirements

Name of Process/Service/Product: Instruction of MGMT 147 students

Name of Process Owner: Brian Cooke, Instructor

Moment of Truth	Classroom Teaching

Negative Factors	**Basic Expectations**	**Delightful Factors**
Failure to meet basic expectations	Learn useable ideas for improving management in my workplace	Enlightenment
No useable tools	Organized presentation	Excitement
Inadequate enthusiasm	Classroom set-up and comfortable for quality learning	Videos
Inadequate knowledge of topics presented	Safe environment for open discussion	Interpersonal discussion and team experience
Lack of control of class including lack of focus and appropriate pace	Attention to individual student's needs and interests	Students learning from each other
No attention to student's personal needs	Interesting presentation of material	Ongoing information and references for deeper knowledge about subject
Lecture by reading from the book	Real world examples of applied theory	Active, experiential learning
	Exercises to build skills and confidence with material	Refreshments

Date completed: March 3, 1994 Date to be revised: March 10, 1994

Table 2. Collaborative Teaching & Learning Deployment Flow Chart

Instructor	Student	Teams
Introduce or review objectives and process for collaborative teaching, learning and testing. Questions, comments and discussion.		
⇩		
Instruct students to form teams.		
		⇩
		Form Teams.
Distribute exercise to each student. ⇦		
	⇨ Complete initial answers and return to instructor.	
Indicate how many answers are incorrect and return to each student. ⇦		
	⇨ Revise/self-correct and return to instructor.	
Distribute exercise to each team. ⇦		
⇩		
Facilitate team process.	Prepare team answers. Return to instructor.	
⇩		
Correct team exercises.		
⇩		
Collate and post individual and team scores.		
⇩		
Discuss Key Learning Points. Debrief.		
⇩		
END		

Table 3. Individual Scores on Unit Tests

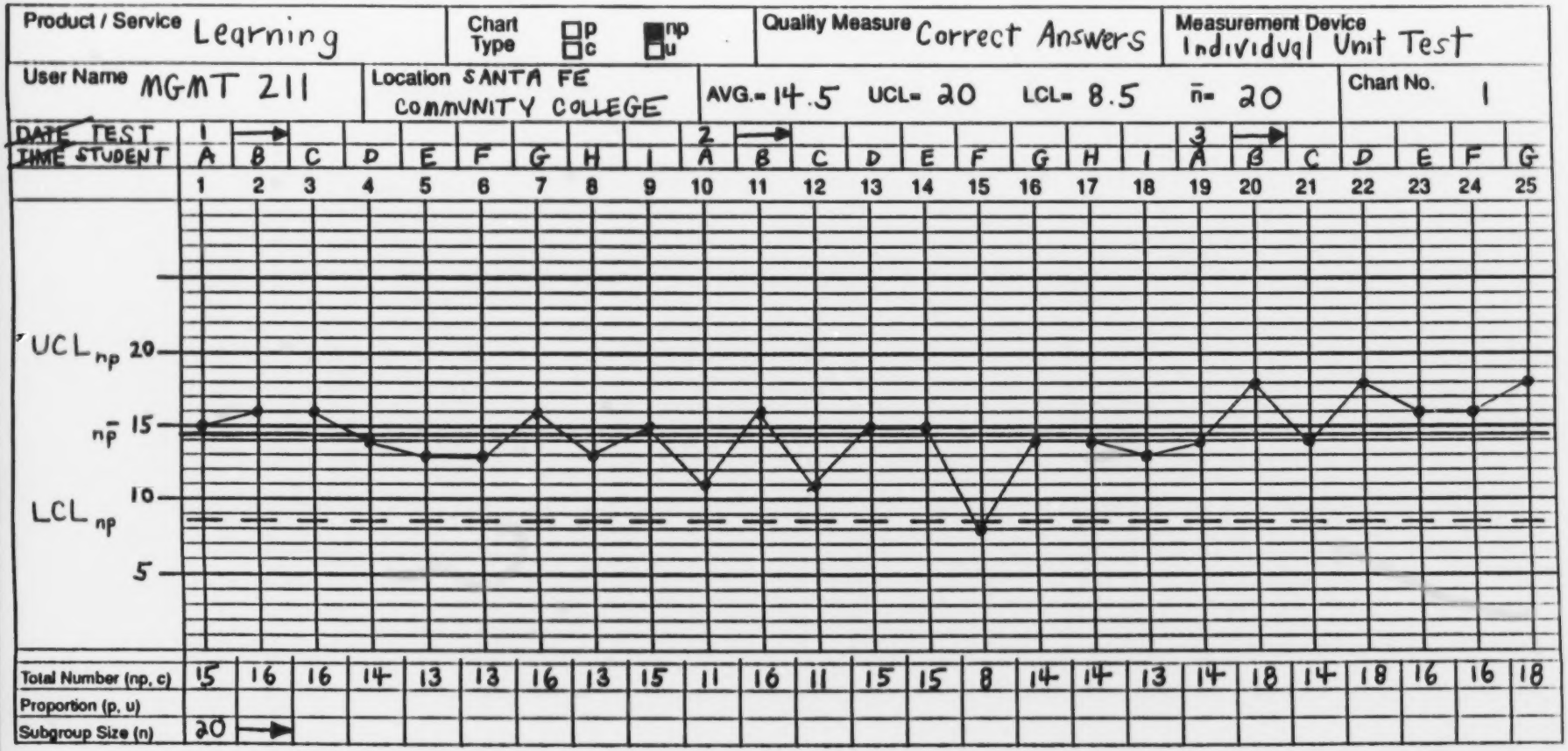
Product / Service Learning
Chart Type p c np u
Quality Measure Correct Answers
Measurement Device Individual Unit Test
User Name MGMT 211
Location SANTA FE COMMUNITY COLLEGE
AVG.= 14.5 UCL= 20 LCL= 8.5 n̄= 20
Chart No. 1
DATE TEST
TIME STUDENT
1 A B C D E F G H I
2 A B C D E F G H I
3 A B C D E F G
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
UCL np 20
np̄ 15
LCL np 10
5
Total Number (np, c) 15 16 16 14 13 13 16 13 15 11 16 11 15 15 8 14 14 13 14 18 14 18 16 16 18
Proportion (p, u)
Subgroup Size (n) 20

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Table 4. **Self-Corrected Individual Scores on Unit Tests**

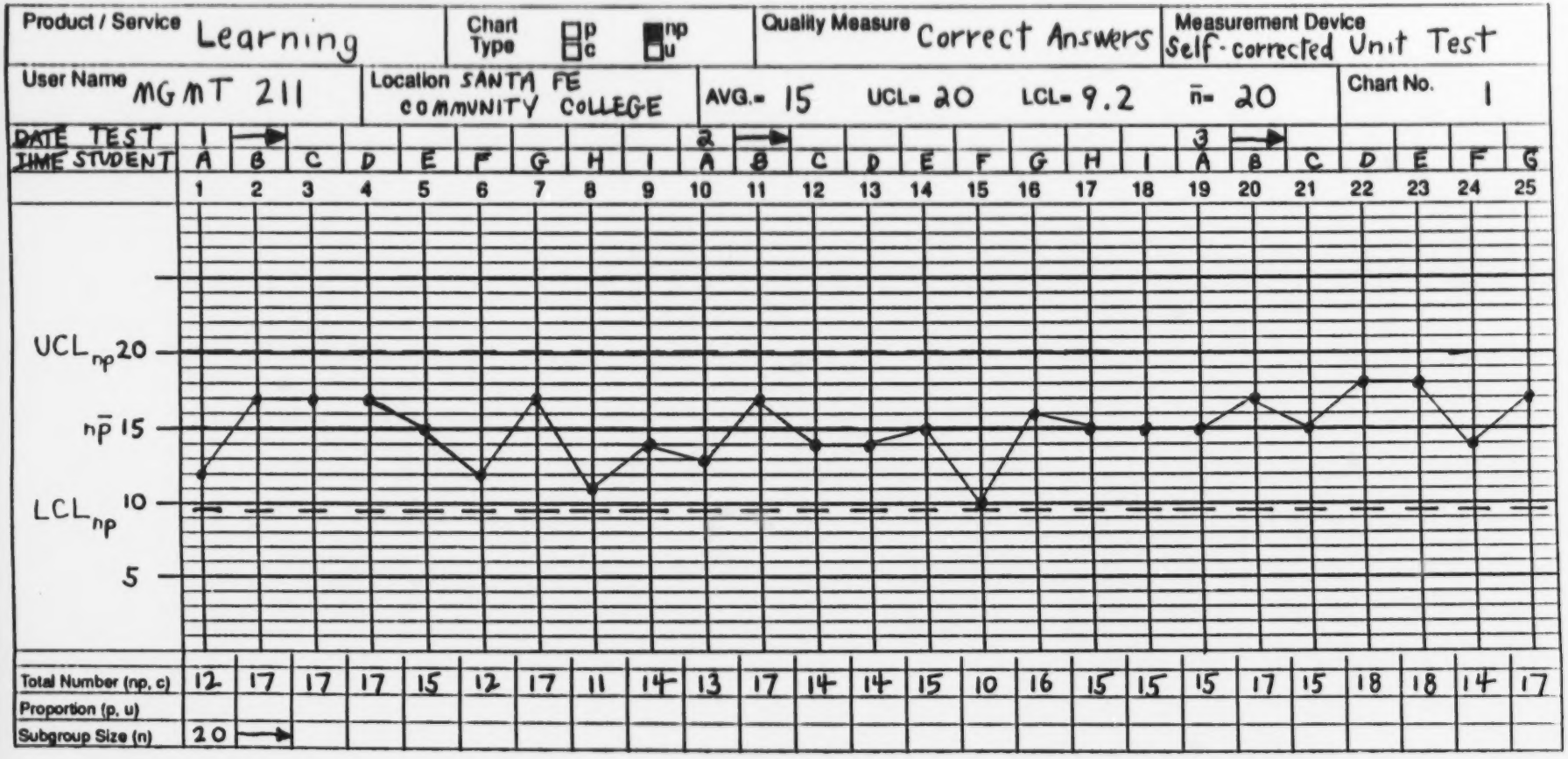
Product / Service Learning
Chart Type p c np u
Quality Measure Correct Answers
Measurement Device Self-corrected Unit Test
User Name MGMT 211
Location SANTA FE COMMUNITY COLLEGE
AVG.= 15 UCL= 20 LCL= 9.2 n̄= 20
Chart No. 1
DATE TEST
TIME STUDENT
1 2 3
A B C D E F G H I A B C D E F G H I A B C D E F G
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
UCL np 20
np̄ 15
LCL np 10
5
Total Number (np, c) 12 17 17 17 15 12 17 11 14 13 17 14 14 15 10 16 15 15 15 17 15 18 18 14 17
Proportion (p, u)
Subgroup Size (n) 20

Table 5. Individual Scores as Team Members on Unit Tests

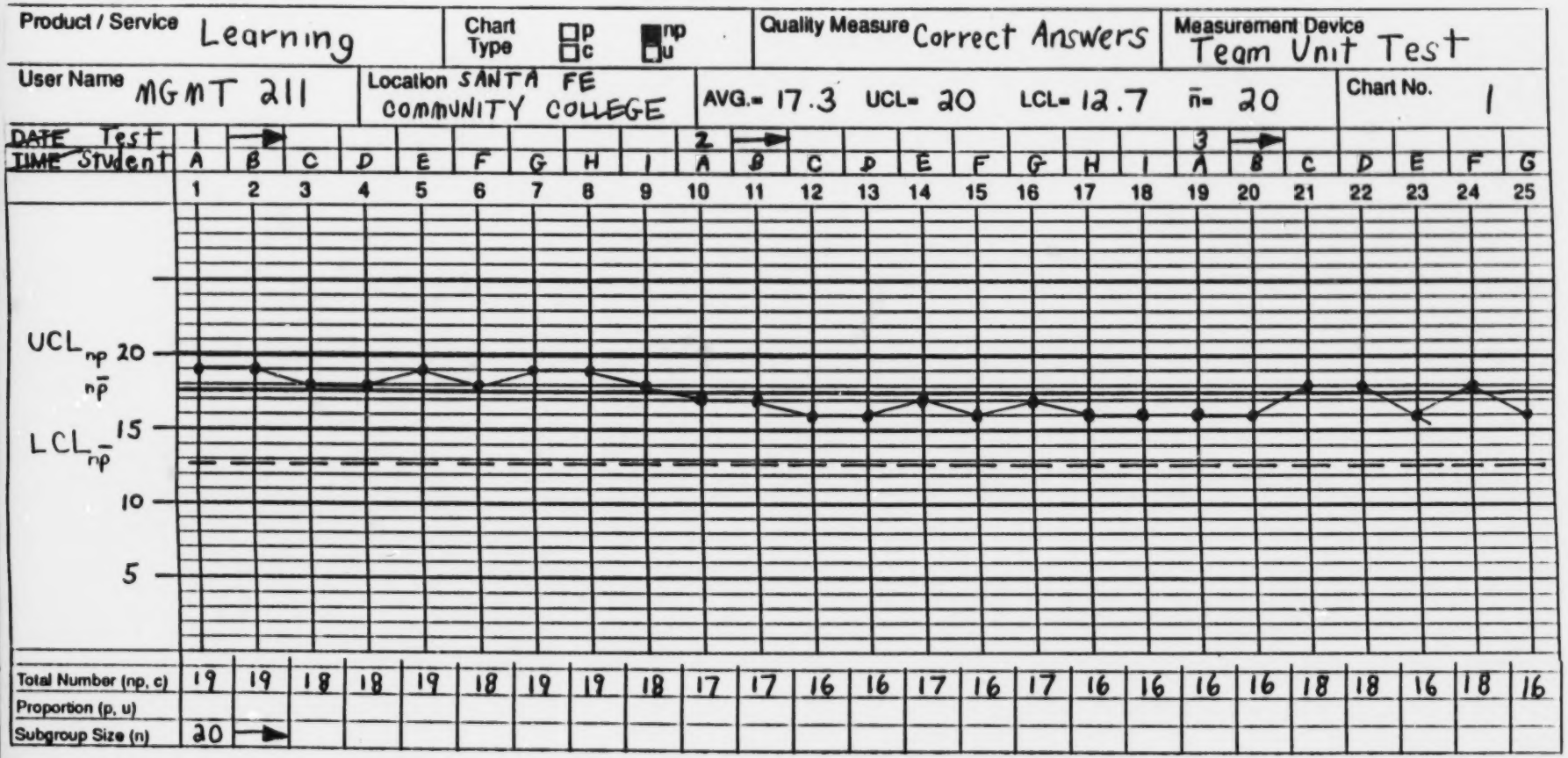

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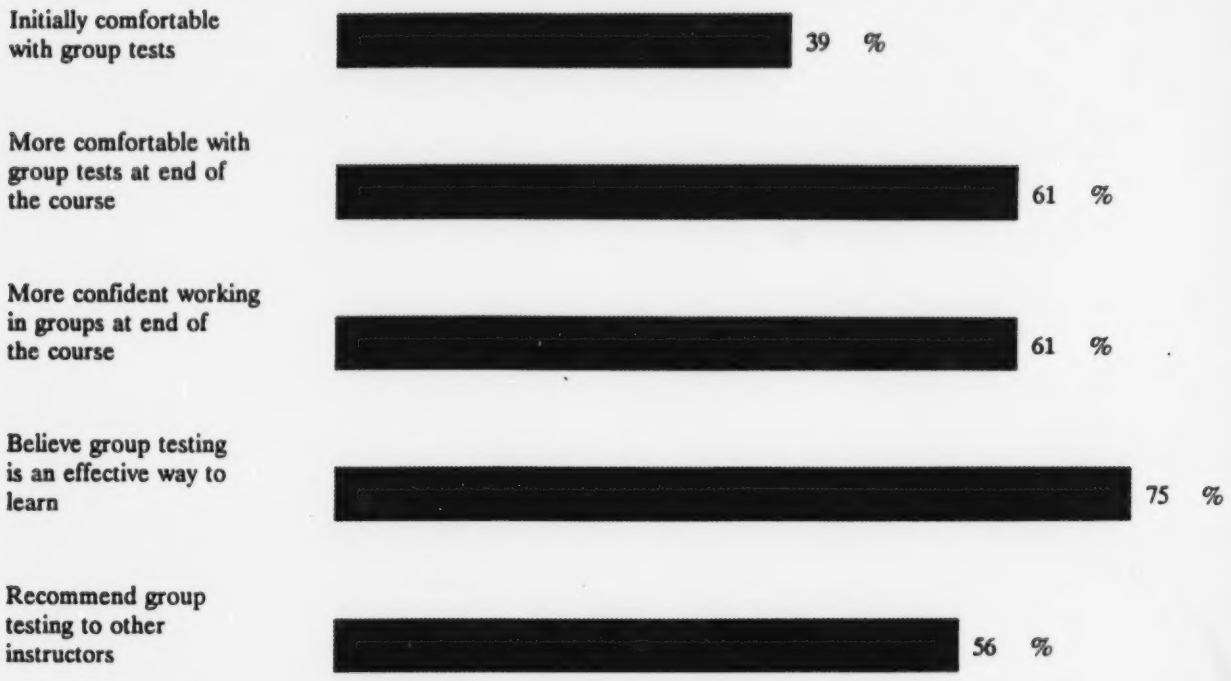
Table 6. Students Assessment of Group Testing


Initially comfortable with group tests
39 %
More comfortable with group tests at end of the course
61 %
More confident working in groups at end of the course
61 %
Believe group testing is an effective way to learn
75 %
Recommend group testing to other instructors
56 %

Percentage of students who agreed or strongly agreed